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Prevalence of Burnout in Medical and Non-medical Undergraduate Malaysian Students in Various International Universities - A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration between all authors. Author TW designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors YCP, VS and NAAR managed the literature searches, authors OWT and MHHA performed the statistical analyses. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine the prevalence as well as potential risk factors of burnout among Malaysian undergraduates who were studying in Malaysia and overseas.
Study Design: Cross-sectional.
Place and Duration of Study: Melaka Manipal Medical College (MMMC), Melaka, between May and June 2016.
Methodology: We circulated the Copenhagen Burnout Inventory-Student Survey (CBI-SS) online to assess personal, studies-related, colleagues-related and teachers-related burnout levels among the students. A total of 538 responses were collected, of which 249 were medical students and 289 non-medical.
Results: The prevalence of burnout in medical and non-medical students were 27.3% and 20.1% respectively. Only the type of course (medical/ non-medical) showed a significant difference in burnout prevalence (odds ratio = 1.50, confidence interval: 1.00 - 2.23). The same was true when the type of course was adjusted towards age and gender in logistic regression analysis. No other

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demographic, socioeconomic and course-related factors showed significant associations with burnout prevalence.

Conclusion: The prevalence of burnout in both medical and non-medical students is high; the former being significantly higher than the latter. Therefore, appropriate measures should be taken to minimise the possibility of future quitting of professions, which will otherwise adversely affect the national economy and development.

Keywords: Burnout; copenhagen burnout inventory; medical; non-medical; student.

1. INTRODUCTION

The term "burnout" was introduced in the 1970s to describe the ramifications of severe stress and high ideals experienced by people working in helping professions (e.g. healthcare professionals) [1]. While there is still an absence of a clear definition of the term mentioned above, it encompasses emotional, mental, and physical exhaustion [2]. The main symptoms of burnout include emotional exhaustion, avoidance of job-related activities and attenuated performance. It does not present with low self-esteem, hopelessness and suicidal tendencies – symptoms more characteristic of depression [1].

In recent years, the scope of burnout has been broadened to include students, as the workload on them has been significantly increased: heavier syllabi, overloaded schedules, increased coursework as well as augmented responsibilities to perform well in work life are some of the things which can sap their interest in studies and potentially trigger emotional disturbances [3]. Other common types of stressors in students include the insufficiency of time for leisure, family, and friends, apart from perfectionism, high self-imposed standards, lack of control, and poor achievements. Regarding medical students, there are additional sources of stress like contact with patients, serious diseases, and death, as well as uncertainty about the future [3,4].

Examples of the adverse outcomes of burnout are poor work quality, alcohol and drug dependence/ abuse, higher likelihood of cardiovascular diseases, sleep problems, of personal health neglect and high-risk behaviours. Even more unfortunate is the fact that there is still insufficient good-quality evidence on the therapeutic interventions for people with burnout, although personal changes and behavioural alterations via cognitive restructuring to have been recommended [3].

Studies conducted in the United States (mainly) and Brazil have revealed the prevalence of burnout to be between 14.9% and 52.8% of different sub-populations of medical students as well as health professionals. Another 24.7% - 51% of the said sub-populations are "at high risk" of getting burnt out [4-8]. Interestingly, while studies measuring the prevalence of burnout among medical students and staff are abound, there is a shortage of research into the same among university students in general. This is undoubtedly a cause for concern, as burnout can result in a cornucopia of disorders, ranging from a headache to psychiatric disorders and suicidal ideation [9,10].

The primary objective of this study is to compare the prevalence of burnout among Malaysian medical and non-medical undergraduates. Concurrently, the association of demographic, socioeconomic and course-related factors with burnout will also be evaluated. Logically, burnout does not arise solely because of course workload. As per literature, support from administration, faculty, friends, family, and classmates was inversely correlated with burnout ($p < 0.05$) [11]. Other associating factors, including extended hours spent in the hospital, grades, uncertainty of plans, struggling to maintain relationships, not having enough time, and interactions with peers are also well-established [11]. However, there is hardly any study examining the relationship between demographic and socioeconomic factors with burnout.

The Copenhagen Burnout Inventory (CBI), which was proposed by Kristensen et al. (2005), was formulated considering fatigue and exhaustion as the central construct and differentiates between domains of burnout [12]. Three forms of burnout were defined according to the life domain from which it may arise, and three sub-scales were constructed accordingly: (1) personal or generic burnout, measuring the degree of physical and psychological exhaustion experienced by the person, regardless of occupational status; (2)

work-related burnout, measuring the degree of physical and psychological exhaustion which is perceived by the person as related to work; and (3) client-related burnout—measuring the degree of physical and psychological exhaustion which is perceived by the person as related to work with clients (in this case, peers and teachers) [12,13]. The inventory consisted of 25 questions divided into four factors: "personal burnout", "work-related burnout", "colleagues-related burnout" and "teachers-related burnout". Responses for each question ranged over a scale of 0 to 4, depending on the frequency of each condition occurring in the respondents.

In this study, CBI was chosen over Maslach Burnout Inventory (MBI) due to its high internal reliability, and smaller non-response rate [14]. CBI appears to possesses excellent psychometric properties and is an appropriate measure of burnout in populations of health professionals. By comparison, difficulties were encountered in demonstrating the nexus between the three (subscale) components of the MBI, due to the different scoring systems between components [15]. Another advantage of CBI is that it can also predict future absenteeism due to sickness, sleep problems, use of painkillers and intentions to quit one's course (or job) [14].

2. METHODOLOGY

Between May and June 2016, we conducted a cross-sectional study to determine the prevalence of burnout among Malaysian undergraduates. Medical and non-medical students of Malaysian nationality, studying in Malaysia or overseas, were included. In contrast, exclusion criteria were fresh graduates, postgraduates as well as non-Malaysians.

This study was approved by institutional ethics committee of MMMC. Details regarding voluntary participation, maintenance of confidentiality of research data, and the right to withdraw from the study at any time were elucidated in the initial part of the online questionnaire.

We distributed the CBI was as an online questionnaire via Google Forms. Apart from that, demographic and socioeconomic profiles as well as course details were also collected to detect any confounding factors. The questionnaire was spread among friends and friends of friends (snowball sampling) through Facebook, whereby we attached the link to the questionnaire on our timelines as well as relevant Facebook groups (e.g. university and former school groups). The respondents were also asked to do the same. Data was automatically collected via Microsoft Excel. In total, 556 responses were received (although the number of people who have viewed the questionnaire but did not answer it was unknown), of which 538 complied with the eligibility criteria. Evidently, a sample size of ≥ 300 was good, ≥ 500 very good, and ≥ 1,000 excellent [15].

We analyzed the data using Epi Info 7.2 and Statistical Package for the Social Sciences version 12 software. The total score of each participant was categorized into "burnout" (≥ 51 points) or "no burnout" (≤ 50 points) [16]. We determined the prevalence of burnout in medical and non-medical students by constructing a bar graph. The mean scores of each of the 4 constructs of the CBI-SS were determined for medical and non-medical students. Also, we used the chi-squared test to (1) calculate the odds ratios (ORs), (2) analyze the association between each demographic and socioeconomic data (e.g. age, gender, ethnicity, etc.) with burnout, and (3) determine the association between course of study and the 4 constructs of the CBI-SS. Additionally, we explored the association between various independent variables and burnout using the logistic regression model, with adjustments towards age and gender. Subsequently, the Cronbach's alpha values for each construct were calculated. The level of significance was set at 95% ($p < 0.05$).

3. RESULTS

3.1 Sociodemographic Data

We received 538 responses from Malaysian undergraduate university students, whose mean age was 22.3 ± 1.3 years (Table 1). Their places of study included Malaysia, India, South Korea, Australia, Indonesia, Japan, United Kingdom, Ireland, Singapore, United States, Germany, New Zealand, Poland, Russia and Taiwan, among others. Meanwhile, the courses of the respondents are as outlined in Chart 1.

With reference to Table 2, there was some discrepancy between the ethnic composition of our respondents and that of the overall population of university-going Malaysians:

3.2 Prevalence of Burnout

As per Chart 2, the prevalence of burnout in medical and non-medical students was 27.3%

and 20.1% respectively. The overall prevalence of burnout was 23.4%. The mean score for the questionnaire was 40.5 ± 17.2 for medical students and 39.3 ± 15.6 for non-medical students.

Table 1. Baseline characteristics of respondents (n = 538)

Variables	Number (%)*
Age	
(years), mean ± SD**	22.3 ± 1.3
Gender	
Male	312 (58.0)
Female	226 (42.0)
Ethnicity	
Malay	174 (32.3)
Chinese	270 (50.2)
Indian	71 (13.2)
Bumiputera Sabah and Sarawak	14 (2.6)
Others	9 (1.7)
Course	
Medical	249 (46.3)
Non-medical	289 (53.7)
Country of study	
Malaysia	406 (75.5)
Overseas	132 (24.5)

**Unless otherwise stated*
***Standard deviation*

The average scores for each construct medical and non-medical students' are as shown in Table 3.

According to the Cronbach's alpha values of the individual constructs in Table 4 below, the overall internal consistency of the CBI-SS was good. According to George & Mallery (2003), values exceeding .9, .8 and .7 denoted "excellent", "good" and "acceptable" internal consistencies respectively [17].

3.3 Possible Risk Factors of Burnout

3.3.1 Demographic factors

According to Table 5, there was no significant difference in the prevalence of burnout between respondents aged ≤ 22 and ≥ 23. The same applied to other demographic factors under study, namely gender, ethnicity, birth order, blood group, relationship status and place of stay when studying. In multivariate analysis, there were no significant differences observed in the likelihood of burnout between different ages and genders (Table 6).

3.3.2 Socioeconomic factors

There was no significant difference in the prevalence of burnout between those taking up a part-time job or otherwise. The same was true for student allowance and family income.

3.3.3 Education-related factors

There was a significantly higher prevalence of burnout among medical students (OR = 1.50,

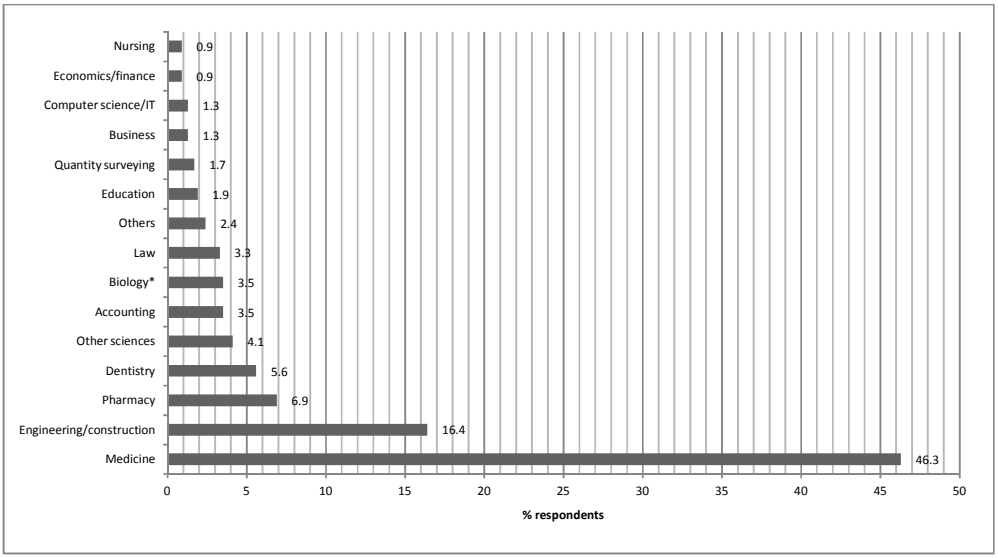

Chart 1. Respondents' courses of study (n = 538)
**Includes biotechnology, biomedical science, plant biology & applied biology*

Table 2. Ethnic composition (by percentage) of our study sample and university-going Malaysians[1p]

Race	Our study (%)	Overall Population (%)
Bumiputera[1]	34.9	68.8
Chinese	50.2	25.2
Indian	13.2	6.0
Others	1.7	N/A
Total	100.0	100.0

[1]The term "Bumiputera" refers to Malays as well as Bumiputera Sabah and Sarawak
Note that the reference we used did not include "other" ethnicities in their calculations

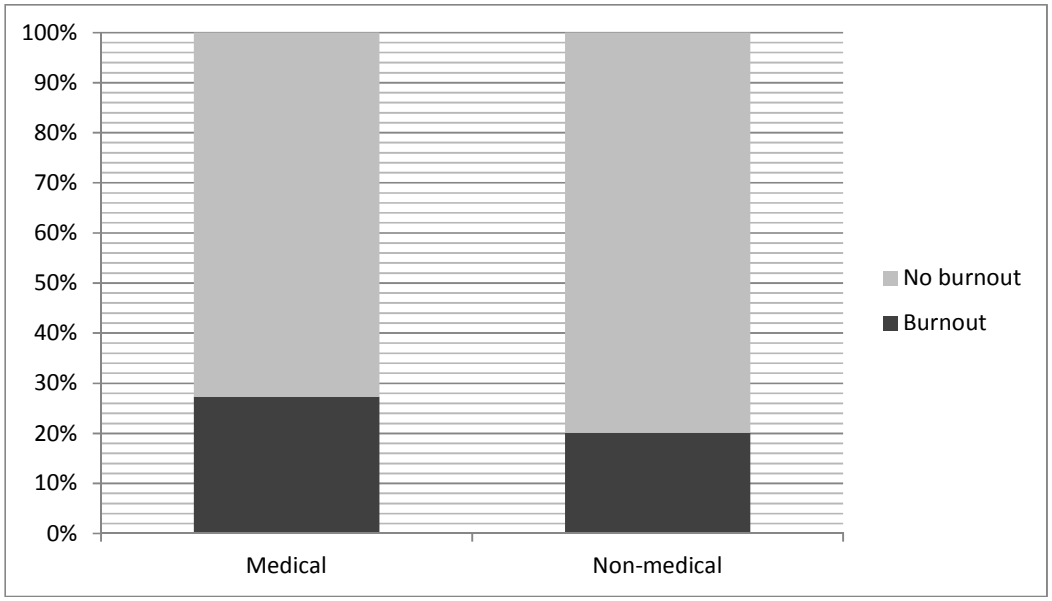

Chart 2. Prevalence of burnout among medical and non-medical students of Malaysian nationality

95% CI 1.00-2.23) vis-à-vis their non-medical counterparts. In the individual analyses of the 4 constructs of CBI-SS, only studies-related burnout was found to be significantly higher in medical students vis-à-vis non-medical students (OR = 1.51, 95% CI = 1.06-2.15; Table 7). Otherwise, there was no significant difference in the said prevalence in terms of country of study, year of study, course shift, sponsorship and being on a study loan or otherwise.

4. DISCUSSION

4.1 Course and Burnout

Evidently, the sole significant finding in this study was that the prevalence of burnout was significantly higher in medical undergraduates than their non-medical counterparts. While we were unable to find any exact comparisons in literature, the burnout prevalence among medical students in this study (27.3%) was well within the range of 14.9% – 52.8% described earlier. A study conducted in Universiti Sains Malaysia (Malaysia University of Science) found that the top 10 stressors among the students in its medical school were academic-related [18]. Lower support, higher stress, and lack of control over one's life were significantly associated with burnout among medical students in another study [4]. However, it is noteworthy that demographic profile, academic achievement, extracurricular achievement, general health, whether or not a parent was a doctor, etc. were not predictors of stress among medical students [18,19]. Academic-related factors were also major risk factors by far for burnout among students in non-medical courses (mainly dental), with minor ones being females, long course shift, criticism from superiors, unfairness within the faculty and fear of future unemployment [20-22].

Table 3. Average scores for each construct of CBI-SS by course

	Personal burnout	Studies-related burnout	Collagues-related burnout	Teachers-related burnout	Total score
Medical	11.21	13.48	8.84	7.00	40.53
Non-medical	11.24	12.75	8.61	6.67	39.28

Table 4. Internal validity of each construct of CBI-SS

Construct	Personal burnout	Studies-related burnout	Colleagues-related burnout	Teachers-related burnout
Cronbach's alpha	.88	.76	.90	.94

Table 5. Possible risk factors for burnout

Parameter	Number (%)		Odds ratio (95% CI)	Chi-square	*P* value
	Burnout (*n* = 126)	No burnout (*n* = 412)			
Age					
22 & below	53 (42.1)	164 (39.8)	1.00 (ref.)		
23 & above	73 (57.9)	248 (60.2)	1.10 (0.73-1.64)	0.20	.65
Sex					
Male	76 (60.3)	236 (57.3)	1.00 (ref.)		
Female	50 (39.7)	176 (42.7)	0.88 (0.59-1.33)	0.37	.55
Ethnicity					
Others	48 (38.1)	8 (1.9)	1.00 (ref.)		
Chinese	24 (19.1)	222 (53.9)	1.73 (0.21-14.16)	1.00	.61
Malay	48 (38.1)	126 (30.6)	3.05 (0.37-25.02)	0.45	.28
Indian	5 (4.0)	47 (11.4)	4.09 (0.48-34.59)	0.26	.17
Bumiputera Sabah and Sarawak	1 (0.8)	9 (2.2)	4.44 (0.42-46.55)	0.34	.19
Birth order					
Middle child	41 (32.5)	148 (35.9)	1.00 (ref.)		
1st/ only child	43 (34.1)	144 (35.0)	1.08 (0.66-1.75)	0.09	.76
Last child	42 (33.3)	120 (29.1)	1.26 (0.77-2.07)	0.87	.35
Blood group[a]					
O	42 (37.2)	156 (42.4)	1.00 (ref.)		
B	30 (26.6)	99 (26.9)	1.13 (0.66-1.92)	0.19	.66
A	30 (26.6)	83 (22.6)	1.34 (0.78-2.30)	1.15	.28
AB	11 (9.7)	30 (8.2)	1.36 (0.63-2.94)	0.62	.43
Relationship status[b]					
Married	0 (0.0)	3 (0.7)	1.00 (ref.)		
Single	84 (66.7)	304 (73.8)	1.11 (0.12-10.11)	0.01	.92
In a relationship	42 (33.3)	105 (25.5)	1.62 (0.18-14.94)	0.19	.67
Course					
Medicine	68 (54.0)	181 (43.9)	1.00 (ref.)		
Non medicine	58 (46.0)	231 (56.1)	1.50 (1.00[c]-2.23)	3.91	.048*
Country of study					
Malaysia	91 (72.2)	315 (76.5)	1.00 (ref.)		
Overseas	35 (27.8)	97 (23.5)	1.25 (0.80-1.96)	0.93	.33
Year of study					
1st year	10 (7.9)	46 (11.2)	1.00 (ref.)		
Neither 1st nor final year	71 (56.4)	224 (54.4)	1.46 (0.70-3.04)	1.02	.31
Final year	45 (35.7)	142 (34.5)	1.46 (0.68-3.12)	0.95	.33

Course shift					
Morning and afternoon	109 (86.5)	365 (88.6)	1.00 (ref.)		
Morning	10 (7.9)	29 (7.0)	1.15 (0.55-2.44)	0.14	.71
Afternoon	5 (4.0)	13 (3.2)	1.28 (0.45-3.69)	0.22	.64
Night	2 (1.6)	5 (1.2)	1.34 (0.26-7.00)	0.12	.73
Place of stay					
At home with parents	6 (4.8)	31 (7.5)	1.00 (ref.)		
Hostel	76 (60.3)	230 (55.8)	1.71 (0.69-4.25)	1.35	.25
Non-hostel	44 (34.9)	151 (36.7)	1.51 (0.59-3.84)	0.74	.39
Sponsored student					
No	54 (42.9)	193 (46.8)	1.00 (ref.)		
Yes	72 (57.1)	219 (53.2)	0.85 (0.57-1.27)	0.62	.43
On loan					
No	97 (77.0)	302 (73.3)	1.00 (ref.)		
Yes	29 (23.0)	110 (26.7)	1.22 (0.76-1.95)	0.68	.41
Part-time job					
Yes	13 (10.3)	44 (10.7)	1.00 (ref.)		
No	113 (89.7)	368 (89.3)	0.96 (0.50-1.85)	0.01	.91
Monthly allowance					
(MYR)	47 (37.3)	183 (44.4)	1.00 (ref.)		
501-1 000	14 (11.1)	48 (11.7)	1.14 (0.58-2.23)	0.14	.71
>2 000	39 (31.0)	116 (28.2)	1.31 (0.81-2.12)	1.19	.28
≤ 500	26 (20.6)	65 (15.8)	1.56 (0.89-2.72)	2.46	.12
1 001-2 000					
Monthly family income					
(MYR)	31 (24.6)	118 (28.6)	1.00 (ref.)		
3 001-6 000	25 (19.8)	83 (20.2)	1.15 (0.63-2.08)	0.20	.65
6 001-10 000	25 (19.8)	82 (19.9)	1.16 (0.64-2.11)	0.24	.63
> 10 000	45 (35.7)	129 (31.3)	1.33 (0.79-2.24)	1.14	.29
≤ 3 000					

CI = confidence interval, OR = odds ratio

[a]*13 respondents with burnout and 44 with no burnout did not know their blood group and were excluded from analysis*

[b]*Haldane correction was performed for analysis of this category, in which 1 was added to each cell*

[c]*The actual value was 1.002*

Table 6. Logistic regression analysis of relationship between course, age and gender

Variable	Burnout		
	Odds ratio (95% CI)	B coefficient	*P* value
Course[a]			
Medicine	1.00 (ref)		
Non-medicine	1.52 (1.01 – 2.31)	0.42	.046

[a]*Adjusted towards age and gender*

As compared to medical students, medical residents are subjected to more stressors which include but are not limited to long working hours, scanty days-off huge workloads, immense intellectual and emotional demands low resident/specialist ratio, high patient/resident ratio, insufficient support from supervisors, limited work autonomy, inadequate opportunities for professional development, and home-work interference. The prevalence of burnout among residents ranged even wider than that of medical students, the former being 14.4 – 70.0%, depending on the type and year of residency [23-25]. In case of Malaysia, around 1 in 5 interns drop out every year due to unsuitability for the profession, long working hours and burnout, among other reasons [26]. However, it should be pointed out that every 1 point of improvement (out of 5) in some of the abovementioned stressors can translate into a reduction of burnout by 37.1 – 59.0% and hence, significantly improve work engagement [23,27]. In a field with heavy responsibilities, work engagement (i.e. vigor, dedication, and absorption in work) is

Table 7. Relationship between course and constructs of burnout

Parameter	Number (%)		Odds ratio (95% CI)	Chi-square	*P* value
	Construct score ≤ 50%	Construct score > 50%			
Personal burnout					
Medical	90 (45.7)	159 (46.6)	1.00 (ref.)		
Non-medical	107 (54.3)	182 (53.4)	0.96 (0.68-1.37)	0.04	.83
Studies-related burnout					
Medical	101 (52.9)	148 (42.7)	1.00 (ref.)		
Non-medical	90 (47.1)	199 (57.3)	1.51 (1.06-2.15)	5.18	**.02***
Collegues-related burnout	53 (47.8)	196 (45.9)	1.00 (ref.)		
Medical	58 (52.2)	231 (54.1)	1.08 (0.71-1.64)	0.12	.73
Non-medical					
Teacher's-related burnout	42 (53.2)	207 (45.1)	1.00 (ref.)		
Medical	37 (46.8)	252 (54.9)	1.38 (0.86-2.23)	1.76	.18
Non-medical					

crucial for the provision of good patient care and reduce medical errors [27].

4.2 Other Factors and Burnout

4.2.1 Overview

While the relationships between the following factors (gender, ethnicity, and year of study) with burnout were not statistically significant, it was still of our interest to determine the consistency of these findings with literature:

4.2.2 Gender and burnout

The lack of association between both was concordant with a study conducted in Serbia, in which MBI scores for emotional exhaustion, depersonalization and personal accomplishment in both genders were insignificant [28]. A similar study in Spain yielded the same finding [29]. It must however be noted that these studies only involved medical students.

4.2.3 Ethnicity and burnout

There appeared to be conflicting evidence for this. In the two studies we referred to, one found a significant relationship between students of minority ethnicities and burnout, [30] while the remaining found otherwise [31]. Again, all the students in both studies were in the medical course in USA. However, since the racial compositions in USA and Malaysia are completely different, this comparison may not be valid.

4.2.4 Year of study and burnout

Again, there was conflicting evidence in this aspect. In the four studies we examined (all involving medical students), two (including one conducted in Malaysia) demonstrated an increase in burnout prevalence in the middle years of medical school vis-à-vis 1st- and final-years [4,18]. A possible explanation for this trend would be that 1st-years were still experiencing novelty and elation when initially entering the course, while 5th-years may have gained adequate skills to manage their studies [18]. In contrast, another study found a higher prevalence in 6th-years as compared to 3rd-years [29]. For the remaining study, there was no discernable trend in burnout prevalence from 1st- to 4th-years [3].

5. STUDY LIMITATIONS

There are several evident limitations of our study; the most evident one being the lack of proper randomization in the sample selection. This, coupled with the fact that we depended mainly on our Facebook friends to respond to the questionnaire as well as spread it, a high degree of selection bias could have been present. One of the most prominent discrepancies between our samples with the university-going population was ethnicity (Table 2) [32]. In addition, this study could have inadvertently excluded those with poorer command of English as the online questionnaire was not translated into other languages. It is noteworthy that not all Malaysian university students have a satisfactory command of English, as reflected by the fact "about 60 000

Malaysians were unemployed" due to a host of factors, including poor English [33].

6. RECOMMENDATIONS

This study could probably be better conducted with a larger sample size, the use of random sampling and face-to-face interviews in addition to the administration of the CBI in the language preferred by each respondent. However, execution of such a study would be very difficult owing mainly to the massive geographical coverage as well as the need for access to some form of database containing a list of all university students of Malaysian nationality.

Further studies can be conducted to determine the prevalence of burnout among students in specific non-medical courses (e.g. Engineering, Law, Accountancy, etc.), as well as the factors giving rise to burnout in the aforementioned students. This would enable the comparison of risk factors of burnout between medical and non-medical students, and also facilitate the provision of relevant measures to alleviate the condition.

Owing to the high prevalence of burnout in both medical and non-medical students, it is highly recommended that they address the condition at the earliest opportunity. Suggested measures include identification of stressors, attitude modification (mainly positive thinking), reassessment of goals, allocation of time for activities of interest, getting enough sleep and exercise, as well as seeking support from friends, family or psychologists [34,35]. Such measures may be able to minimize the possibility of future quitting of professions, which would otherwise be a setback to the national economy and development.

7. CONCLUSION

The prevalence of burnout in both medical and non-medical students is high; the former being significantly higher than the latter.

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CONSENT

Written consent was obtained from all participants.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. PubMed Health. Depression: What is burnout syndrome? Accessed 26 May 2016. Available:http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0072470/
2. HelpGuide.org. Preventing Burnout: Signs, symptoms, causes, and coping strategies. Accessed 19 June 2016. Available:http://www.helpguide.org/articles/stress/preventing-burnout.htm
3. Gilson CA, Hercílio RS, Paulo CA, Beatriz CA, Gilson HA. The prevalence of burnout syndrome in medical students. Arch. Clin. Psychiatry (São Paulo). 2016;43(1):6-10.
4. Santen SA, Holt DB, Kemp JD, Hemphill RR. Burnout in medical students: Examining the prevalence and associated factors. South Med J. 2010;103(8): 758-63. De Oliveira GS Jr, Almeida MD.
5. Ahmad S, Fitzgerald PC, McCarthy RJ. Anesthesiology residency program director burnout. J Clin Anesth. 2011;23(3):176-82.
6. De Oliveira Jr GS, Chang R, Fitzgerald PC. The prevalence of burnout and depression and their association with adherence to safety and practice standards: A survey of United States anesthesiology trainees. Anesth Analg. 2013;117(1):182-93.
7. Jacobs SR, Dodd D. Student burnout as a function of personality, social support, and workload. Journal of College Student Development. 2003;44(3):291-303.
8. Dyrbye LN, Massie FS, Eacker A. Relationship between burnout and

professional conduct and attitudes among US medical students. JAMA. 2010;11:73-80.
9. Maslach C, Jackson SE, Leiter MP. Maslach burnout inventory manual. 3th ed. Palo Alto: Consulting Psychologists Press. 1996;36-7.
10. Ishak W, Nikravesh R, Lederer S, Perry R, Ogunyemi D, Bernstein C. Burnout in medical students: A systematic review. Clin Teach. 2013;10(4):242-5.
11. Boudreau D, Santen SA, Hemphill RR, Dobson J. Burnout in medical students: Examining the prevalence and predisposing factors during the four years of medical school. Annals of Emergency Medicine. 2004;44(4):S75-6.
12. Yeh WY, Cheng Y, Chen CJ, Hu PY, Kristensen TS. Psychometric properties of the Chinese version of Copenhagen burnout inventory among employees in two companies in Taiwan. International Journal of Behavioral Medicine. 2007;14(3): 126-33.
13. Winwood P, Winefield AH. Comparing two measures of burnout among dentists in Australia. International Journal of Stress Management. 2004;11(3):282.
14. Kristensena S, Borritza M, Villadsena E, Christensena KB. The Copenhagen Burnout Inventory: 15. A new tool for the assessment of burnout. Work & Stress. PAREonline. Sample size and subject to item ratio in principal components analysis. 2005;19(3):192-207. Accessed 14 June 2016.
Available:http://pareonline.net/getvn.asp?v=9&n=11
16. Divinakumar KJ, Shivram BP, Ram CD. Perceived stress, psychological well-being and burnout among female nurses working in government hospitals. Int J Res Med Sci. 2014;2(4):1511-15.
17. George DM, Mallery YP. SPSS for windows step by step: A simple guide and reference. 11.0 update; 2003.
18. Muhamad SBY, Ahmad FAR, Mohd JY. Prevalence and sources of stress among University Sains Malaysia medical students. Malaysian J Med Sci. 2010;17(1):30-7.
19. Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, Creed F. Psychological stress and burnout in medical students: A five-year prospective longitudinal study. J R Soc Med. 1998;91:237-43.
20. Pöhlmann K, Jonas I, Ruf S, Harzer W. Stress, burnout and health in the clinical period of dental education. Eur J Dent Educ. 2005;9(2):78-84.
21. Cigdem A, Murat B, Huseyin T, Banu O, Gul K. The prevalence and consequences of burnout on a group of preclinical dental students. Eur J Dent. 2015;9(3):356-63.
22. Morteza C, Mohsen AA, Davood H. The association of academic burnout with self-efficacy and quality of learning experience among Iranian students. Springer Plus. 2013;2:677
23. Zis P, Anagnostopoulos F, Sykioti P. Burnout in medical residents: A study based on the job demands-resources model. The Scientific World Journal; 2014.
24. Zis P, Artemiadis AK, Lykouri M, Xirou S, Roussopoulou A, Papageorgiou E, Bakola E, Anagnostopoulos F. Residency training: Determinants of burnout of neurology trainees in Attica, Greece. Neurology. 2015;85(11):e81-4.
25. Anagnostopoulos F, Demerouti E, Sykioti P, Niakas D, Zis P. Factors associated with mental health status of medical residents: A model-guided study. Journal of Clinical Psychology in Medical Settings. 2015;22(1):90-109.
26. Housemen do not complete training stint for various reasons. The Star [newspaper on the internet]. 2015 Mar 30 [cited 2018 Mar 11].
Available:https://www.thestar.com.my/news/nation/2015/03/30/one-in-five-quit-each-year-housemen-do-not-complete-training-stint-for-various-reasons/
27. Zis P, Anagnostopoulos F, Artemiadis AK. Residency Training: Work engagement during neurology training. Neurology. 2016;87(5):e45-8.
28. Backović DV, Živojinović JI, Maksimović J, Maksimović M. Gender differences in academic stress and burnout among medical students in final years of education. Psychiatria Danubina, 2012;24(2):175-81.
29. Galán F, Sanmartín A, Polo J, Giner L. Burnout risk in medical students in Spain using the maslach burnout inventory-student survey. International Archives of Occupational and Environmental Health. 2011;84(4):453-9.
30. Dyrbye LN, ThomasMR, Eacker A. Race ethnicity, and medical student well-being in the United States. Arch Intern Med. 2007;167(19):2103-9.

31. Dyrbye LN, Thomas MR, Huschka MM. A multicenter study of burnout, depression, and quality of life in minority and nonminority us medical students. Mayo Clinic Proceedings. 2006;81(11):1435-42.
32. Mukherjee H. Access to and equity in higher education-Malaysia. The World Bank; 2010.
33. Singh GKG, Singh SKG. Malaysian graduates' employability skills. UNITAR e-Journal. 2008;4(1):15-45.
34. Mayo Clinic. Job burnout: How to spot it and take action. Accessed 22 June 2016. Available:http://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/burnout/art-20046642?pg=1
35. Mind Tools. Recovering from burnout. Accessed 22 June 2016. Available:https://www.mindtools.com/pages/article/recovering-from-burnout.htm

APPENDIX

APPENDIX 1 (QUESTIONNAIRE USED)

DEMOGRAPHIC & SOCIOECONOMIC PROFILE

1. Age: _____ years
2. Gender: M/ F
3. Ethnicity: Malay / Chinese/ Indian/ Bumiputera Sabah or Sarawak/ others
4. Nationality: Malaysian/ non-Malaysian
5. Birth order: 1st/ Middle/ Last
6. Blood group: A/ B/ AB/ O/ unknown
7. Relationship status: Single/ In a relationship/ Married
8. Course (e.g.medicine, engineering, etc): _____
9. Institution name, place, country (e.g. USM, Serdang, Malaysia): _____
10. Current status of education: 1st year/ neither 1st nor final year / final year / fresh graduate
11. Level of study: Undergraduate / Postgraduate
12. Lecture/ lesson timings:

a) Mainly morning
b) Mainly afternoon
c) Mainly morning & afternoon
d) Mainly night

13. Accommodation when studying: hostel/ non-hostel, with friends/ at home, with parents or guardians
14. Sponsorship (Eg. JPA/ MARA): Yes/No
15. Education loan (e.g. PTPTN/ bank loan): Yes/ No
16. Part-time job: Yes/ No
17. Allowance per month:

a) < RM 500
b) RM500-RM1000
c) RM1000-RM2000
d) >RM2000

18. Total parental income:

a) < RM 2000
b) RM 2000 – RM 5000
c) RM 5000 – RM 10000
d) > RM 10000

COPENHAGEN BURNOUT INVENTORY – STUDENT SURVEY

Instructions: Please tick the most relevant score for each question.
0 = Never (about 0% of the time)
1 = Rarely (about 25% of the time)
2 = Sometimes (about 50% of the time)
3 = Frequently (about 75% of the time)
4 = Always (about 100% of the time)

Personal Burnout

No.	Questions	0	1	2	3	4
1	How often do you feel tired?					
2	How often are you physically exhausted?					
3	How often are you emotionally exhausted?					
4	How often do you think “I can’t take it anymore?”					
5	How often do you feel worn out?					
6	How often do you feel weak and susceptible to illness?					

Studies-related burnout

No.	Questions	0	1	2	3	4
7	Do you feel worn out at the end of working day?					
8	Are you exhausted in the morning at the thought of another day at work?					
9	Do you feel that every working hour is tiring for you?					
10	Do you have enough energy for family and friends during leisure time?					
11	Is your studies emotionally exhausting?					
12	Do your studies frustrate you?					
13	Do you feel burnt out because of your studies?					

Colleagues-related burnout

No.	Questions	0	1	2	3	4
14	Do you find it hard to work with colleagues?					
15	Does it drain your energy to work with colleagues?					
16	Do you find it frustrating to work with colleagues?					
17	Do you feel that you give more than you get back when you work with colleagues?					
18	Are you tired of working with colleagues?					
19	Do you sometimes wonder how long you will be able to continue working with colleagues?					

Teachers-related burnout

No.	Questions	0	1	2	3	4
20	Do you find it hard to work with teachers?					
21	Does it drain your energy to work with teachers?					
22	Do you find it frustrating to work with teachers?					
23	Do you feel that you give more than you get back when you work with teachers?					
24	Are you tired of working with teachers?					
25	Do you sometimes wonder how long you will be able to continue working with teachers?					

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